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| 09/800,627 | 03/07/2001 | Koichiro Tanaka | SEL 245 | 3352 |

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EXAMINER

THOMAS, TONIAE M

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

2822

DATE MAILED: 04/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/800,627

Applicant(s)

TANAKA ET AL.

Examiner

Toniae M. Thomas

Art Unit

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-- Th MAILING DATE of this communication appears on the cover sheet with the correspondenc address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-64 is/are pending in the application.
- 4a) Of the above claim(s) 2,3,5-7,9-11,13-15,17-19,21-23 and 25-52 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,8,12,16,20,24 and 53-64 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This Office action is an official response to the amendment filed on 22 January 2004. The amendment added claims 53-64. Currently, claims 1-64 are pending. Claims 2, 3, 5-7, 9-11, 13-15, 17-19, 21-23, and 25-28 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a non-elected species; whereas, claims 29-52 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a non-elected invention. The rejection of claims 1, 4, 8, 12, 16, 20, 24, and 53-64 follows.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. *Claims 1, 4, 8, 12, 16, 24, 53-56, 58-62, and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maekawa (US 6,066,547) in view of Kusumoto et al. (5,953,597).¹*

Maekawa discloses a method of manufacturing a semiconductor device (figs. 4-11 and col. 5, line 24 to col. 8, line 3). The method comprises the following steps substantially as claimed: forming a first semiconductor film 14 comprising amorphous semiconductor over an insulating surface 16 (fig. 4 and col. 5, lines 40-53); introducing a

¹ Maekawa was relied upon in the previous action mailed on 18 August 2003.

metallic element for promoting crystallization into the first semiconductor film (fig. 8 and col. 6, lines 7-29); partially crystallizing the first semiconductor film by a heat treatment to form a second semiconductor film comprising polycrystalline semiconductor (col. 6, lines 30-67); annealing the second semiconductor film to form a third polycrystalline semiconductor film (col. 7, lines 1-18); forming a gate insulating film 18 over the third semiconductor film (fig. 5 and col. 5, lines 54-59); and forming a gate electrode 20 over the gate insulating film (fig. 6 and col. 5, lines 60-65).

The metallic element may be one of nickel, palladium, and platinum (col. 6, lines 9-12 and 24-26).

The semiconductor device is a liquid crystal display (col. 5, lines 38-40).

Maekawa teaches that laser annealing may be used when annealing the second semiconductor film to form the third polycrystalline semiconductor film, wherein the laser annealing is performed using an excimer laser (col. 7, lines 47-49). Maekawa does not teach that the laser beam has a wavelength from 360 to 650 nm, or wavelength from 400 to 600 nm; or that the laser beam is selected from one of a second harmonic of a YAG laser, a second harmonic of a glass laser; an Ar laser, a second harmonic of an YLF laser, and a second harmonic of an YV04 laser.

The Kusumoto et al. patent (Kusumoto) discloses a method of manufacturing a semiconductor device, the method comprising a step of crystallizing an amorphous semiconductor film (col. 6, lines 3-8). Since photo-annealing is a low-temperature process, it is the method preferably used to crystallize the amorphous semiconductor

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film (col. 1, lines 33-37). Photo-annealing is carried out using various excimer and YAG lasers (col. 2, lines 50-59). The YAG lasers include a second harmonic of a YAG laser (col. 2, lines 50-59), wherein the second harmonic has a wavelength of 532 nm.

Since both Maekawa and Kusumoto disclose a method for forming thin film transistors, the laser annealing disclosed by Kusumoto et al. would have been recognized in the pertinent art of Maekawa by one of ordinary skill in the art at the time the invention was made.

It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to modify the process of Maekawa in view of Kusumoto, by laser annealing using a second harmonic of a YAG laser in place of an excimer laser, as taught by Kusumoto, since both an excimer laser and a second harmonic YAG laser are art-recognized equivalents used in photo-annealing methods to crystallize amorphous silicon (Kusumoto - col. 2, lines 50-59).

Maekawa does not teach that an area of each of amorphous regions in the second polycrystalline semiconductor film is equal to or less than $10.0 \mu\text{m}^2$, or that an area of at least one of the amorphous regions is equal to or greater than $0.30 \mu\text{m}^2$. It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to form each of amorphous regions in the second polycrystalline semiconductor film having an area equal to or less than $10.0 \mu\text{m}^2$, or to form at least one amorphous region having an area equal to or greater than $0.30 \mu\text{m}^2$, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or

working ranges involves only routine skill in the art (*In re Aller* 105 USPQ 233 (CCPA 1955)).

3. *Claims 20, 57, and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maekawa in view of Kusumoto et al. as applied to claim 4 above, and further in view of Ohtani et al. (EP 0 978 877A2).*²

As discussed above, Maekawa teaches that the semiconductor device is a liquid crystal display. However, Maekawa does not teach that the liquid crystal display is part of a portable telephone, a video camera, a digital camera, a projector, a goggle type display, a personal computer, a DVD player, an electronic book, or a portable information terminal.

Ohtani et al. discloses a method for forming a liquid crystal display, which comprises a thin film transistor. Ohtani et al. teaches that the liquid crystal display may be incorporated into one of the following devices: computer, a DVD player, an electronic book, and a portable information terminal (figs. 13A-13F and par. [127]- par. [134]).

One having ordinary skill in the art would have been motivated to modify the combination of Maekawa and Kusumoto et al. by incorporating the liquid crystal display into one of a portable telephone, a video camera, a digital camera, a projector, a personal computer, a DVD player, an electronic book, and a portable information

² The Applicant submitted the Ohtani published application as prior art.

terminal, as taught by Ohtani et al., because a liquid crystal display displays a fine image at a high speed.

Response to Arguments

4. *Applicant's arguments filed 22 January 2004 have been fully considered but they are not persuasive.*

5. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation to combine is found in the references themselves. As discussed above, it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to modify the process of Maekawa in view of Kusumoto, by laser annealing using a second harmonic of a YAG laser in place of an excimer laser, as taught by Kusumoto, since both an excimer laser and a second harmonic YAG laser are art-recognized equivalents used in photo-annealing methods to crystallize amorphous silicon (Kusumoto – col. 2, lines 50-59).

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (571) 272-1846. The examiner can normally be reached on Monday-Thursday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-1675.



TMJ

April 19, 2004

Mary Wilczewski
Primary Examiner